

What is claimed is:

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1. A process for obtaining lipid from microorganisms comprising:
    - (a) lysing cells of the microorganisms to produce a lysed cell mixture;
    - (b) treating said lysed cell mixture to produce a phase separated mixture comprising a heavy layer and a light layer, wherein said heavy layer comprises an aqueous solution and said light layer comprises said lipid;
    - (c) separating said heavy layer from said light layer; and
    - (d) obtaining said lipid from said light layer.
  2. The process of Claim 1, wherein said step (b) comprises centrifuging said lysed cell mixture.
  3. The process of Claim 2, wherein said light layer comprises an emulsified lipid.
  4. The process of Claim 3 further comprising:
    - (e) adding an aqueous extraction solution to said light layer of step (c); and
    - (f) repeating said steps (b), (c) and (e) until said lipid becomes substantially non-emulsified prior to said step (d).
  5. The process of Claim 3, wherein said emulsified lipid comprises a suspension of said lipid in an aqueous solution.
  6. The process of Claim 1, wherein said aqueous solution comprises solid cell materials.
  7. The process of Claim 1, wherein said microorganisms are obtained from a fermentation process.
  8. The process of Claim 7 further comprising adding a base to a fermentation broth.
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9. The process of Claim 8, wherein said base is selected from the group consisting of hydroxides, carbonates, bicarbonates, and mixtures thereof.

10. The process of Claim 7 further comprising solubilizing at least part of proteinaceous compounds in a fermentation broth.

11. The process of Claim 1, wherein said step (a) comprises heating said microorganisms to temperature of at least about 50 °C.

12. The process of Claim 1, wherein said microorganism is capable of growth at salinity level of less than about 12 g/L of sodium chloride.

13. The process of Claim 1, wherein said microorganism comprises at least about 30% by weight of lipid.

14. The process of Claim 1, wherein said microorganism is selected from the group consisting of algae, fungi, bacteria and protist.

15. The process of Claim 14, wherein said microorganisms comprise microorganisms of the order Thraustochytriales.

16. The process of Claim 15, wherein said microorganisms are selected from the genus *Thraustochytrium*, *Schizochytrium* and mixtures thereof.

17. The process of Claim 16, wherein said microorganisms are selected from the group consisting of microorganisms having the identifying characteristics of ATCC number 20888, ATCC number 20889, ATCC number 20890, ATCC number 20891 and ATCC number 20892, mutant strains derived from any of the foregoing, and mixtures thereof.

18. The process of Claim 1, wherein said microorganisms are capable of producing at least about 0.1 grams per liter per hour of docosahexaenoic acid.

19. The process of Claim 1, wherein at least about 30 % of said lipid is docosahexaenoic acid.

20. A process for obtaining lipids from microorganisms comprising:

(a) growing said microorganisms in a fermentation medium to produce a fermentation broth;

(b) solubilizing at least a part of any proteins present in said fermentation broth;

(c) lysing cells of said microorganisms to produce a lysed cell mixture;

(d) treating said lysed cell mixture to produce a phase separated mixture comprising a heavy layer and a light layer, wherein said heavy layer comprises an aqueous solution and said light layer comprises emulsified lipids;

(e) separating said heavy layer from said light layer; and

(f) obtaining said lipids from said light layer.

21. The process of Claim 20, wherein said step of dissolving proteins comprises contacting said fermentation broth with a base.

22. The process of Claim 21, wherein said base is selected from the group consisting of hydroxides, carbonate, bicarbonates and mixtures thereof.

23. The process of Claim 20, wherein said step of lysing cells comprises heating said microorganisms to a temperature of at least about 50°C.

24. The process of Claim 20, wherein said step of producing the phase separated mixture comprises centrifuging said lysed cell mixture.

25. The process of Claim 20, wherein said step of obtaining said lipids from said light layer comprises:

(A) adding an aqueous washing solution to said light layer;

(B) separating said aqueous washing solution from said light layer; and

(C) repeating said steps (A) and (B) until said lipid becomes substantially non-emulsified.

26. The process of Claim 20, wherein said aqueous solution comprises solid cell materials.

27. The process of Claim 20, wherein said microorganism is capable of growth at salinity level of less than about 12 g/L of sodium chloride.

28. The process of Claim 20, wherein said microorganism comprises at least about 30% by weight of lipid.

29. The process of Claim 20, wherein said microorganism is selected from the group consisting of algae, fungi, bacteria and protist.

30. The process of Claim 29, wherein said microorganisms comprise microorganisms of the order Thraustochytriales.

31. The process of Claim 30, wherein said microorganisms are selected from the genus *Thraustochytrium*, *Schizochytrium* and mixtures thereof.

32. The process of Claim 31, wherein said microorganisms are selected from the group consisting of microorganisms having the identifying characteristics of ATCC number 20888, ATCC number 20889, ATCC number 20890, ATCC number 20891 and ATCC number 20892, mutant strains derived from any of the foregoing, and mixtures thereof.

33. The process of Claim 20, wherein said microorganisms are capable of producing at least about 0.1 grams per liter per hour of docosaehaenoic acid.

34. The process of Claim 20, wherein at least about 30 % of said lipid is docosaehaenoic acid.

35. A process for obtaining lipids from microorganisms comprising:

(a) growing said microorganisms in a fermentation medium to produce a fermentation broth;

(b) contacting said fermentation broth with a base to dissolve at least a part of any proteins present in said fermentation broth;

(c) increasing the temperature of said fermentation broth to at least about 50 °C to lyse cells of said microorganisms to produce a lysed cell mixture;

(d) separating substances of different densities from said lysed cell mixture to produce a phase separated mixture comprising a heavy layer and a light layer, wherein said heavy layer comprises an aqueous solution and said light layer comprises emulsified lipids;

(e) removing said heavy layer from said phase separated mixture;

(f) adding an aqueous washing solution to said light layer;

(g) separating substances of different densities from said mixture of step (f);

(h) removing said heavy layer from said phase separated mixture; and

(i) repeating said steps (f)-(h) until said lipid becomes substantially non-emulsified.

36. The process of Claim 35, wherein said base is selected from the group consisting of hydroxides, carbonates, bicarbonates, and mixtures thereof.

37. The process of Claim 35, wherein said step of producing the phase separated mixture comprises centrifuging said lysed cell mixture.

38. The process of Claim 35, wherein said aqueous solution of step (d) comprises solid cell materials.

39. The process of Claim 35, wherein said microorganism is capable of growth at salinity level of less than about 12 g/L of sodium chloride.

40. The process of Claim 35, wherein said microorganism comprises at least about 30% by weight of lipid.

41. The process of Claim 35, wherein said microorganism is selected from the group consisting of algae, fungi, bacteria and protist.

42. The process of Claim 35, wherein said microorganisms comprise microorganisms of the order Thraustochytriales.

43. The process of Claim 42, wherein said microorganisms are selected from the genus *Thraustochytrium*, *Schizochytrium* and mixtures thereof.

44. The process of Claim 43, wherein said microorganisms are selected from the group consisting of microorganisms having the identifying characteristics of ATCC number 20888, ATCC number 20889, ATCC number 20890, ATCC number 20891 and ATCC number 20892, mutant strains derived from any of the foregoing, and mixtures thereof.

45. The process of Claim 35, wherein said microorganisms are capable of producing at least about 0.1 grams per liter per hour of docosahexaenoic acid.

46. The process of Claim 35, wherein at least about 30 % of said lipid is docosahexaenoic acid.

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